

## **ACTUATION DEVICE FOR VEHICLE SEATS**

### **FIELD OF THE INVENTION**

**[001]** The invention relates to a device that allows both quick and convenient adjustment of a seat back position relative to a seat bottom over a long adjustment path as well as fine-stepped adjustment.

### **BACKGROUND OF THE INVENTION**

**[002]** In a device of the type disclosed in DE 198 55 004 A1, for adjustment of a seat back, a stepped switching mechanism with a self-limiting drive actuated by a swiveling lever is constantly engaged. Various drives allow the adaptation to various adjustment conditions. When elements of a vehicle seat are displaced by small adjustment steps, the stepped switching mechanism must be actuated unnecessarily often to achieve large displacement. Actuation along long adjustment paths is thus inconvenient and time-consuming.

### **SUMMARY OF THE INVENTION**

**[003]** Based on this state of the art, it is the task of the invention to create a device of the known type so that it allows both quick and convenient adjustment of a seat back position

relative to a seat bottom over a long adjustment path as well as fine-stepped adjustment.

**[0004]** The adjustment of a vehicle seat can be accomplished with or without a stepped switching mechanism. The mechanism connecting the stepped switching mechanism with the adjustment device is simple and inexpensive.

**[0005]** The invention features a device to actuate a drive gear of an adjustment mechanism of a seat with a switching mechanism manually operable in two directions by means of a swiveling lever that is rotationally connected with said drive gear in order to rotate it. A release mechanism provides a releasable rotational connection between the switching mechanism and the drive gear, for providing a rotating connection between the switching mechanism and the drive gear. In a preferred embodiment, an intermediate gear is provided between the switching mechanism and the drive gear. Providing an intermediate gear also promotes positive actuation

**[0006]** Separation of the drive gear and the switching mechanism may be provided by means of a stepped switching mechanism swiveling lever that can be actuated without the exertion of a large actuation force. The lever may include the release mechanism.

**DESCRIPTION OF THE DRAWINGS**

[0007] These and other features and advantages of the present invention will be better understood by reading the following detailed description, taken together with the drawings wherein:

[0008] Figure 1 is a schematic side view of a vehicle seat with a tilt adjustment mechanism and an actuation device for the seat back according to the present invention;

[0009] Figure 2 is an enlarged side view of an adjustment mechanism and an actuation device as shown in Figure 1 in its initial position;

[0010] Figure 3 is the view as shown in Figure 2 illustrating the adjustment mechanism and actuation device areas;

[0011] Figure 4 is a side view as in Figure 2 with the coupled swiveling lever used to release the rotating connection between the adjustment mechanism and actuation device; and

[0012] Figure 5 is a side view as in Figure 2 with the rotating connection in the released position.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

[0013] In the figures, the same parts receive the same reference designations, and are distinguished from one another using apostrophes as necessary.

[0014] A seat back 2 is mounted to a seat body 1 so that it may swivel about a horizontal tilt axis 3b. The tilt of the seat back 2 may be adjusted by means of an adjustment device 3. The

adjustment device 3 is driven manually by an actuation device 4 via an intermediate gear 5. The actuation device 4 includes a well known stepped switching mechanism 4c that is not shown in detail in the Figures.

**[0015]** The intermediate gear 5 is mounted on a swiveling lever 6 that is free to rotate about a rotation axis 4b of the stepped switching mechanism 4c. The seat back 2 is pre-tensioned along the direction of vehicle travel by a spring 7 mounted on the seat body 1.

**[0016]** The stepped switching mechanism 4c includes a drive take-off gear 4d that is constantly engaged with the intermediate gear 5. The stepped switching mechanism 4c offers adjustment movements in opposing directions. It is operated exclusively by a swiveling lever 4a. Drive forces from the adjustment mechanism 3 acting in response on the stepped switching mechanism 4c will not cause displacement of the stepped switching mechanism 4c even when the swiveling lever 4a is in the neutral central setting.

**[0017]** The swiveling lever 4a is mounted free to rotate about the same swivel axis 4b as the swing lever 6. The free end of the swiveling lever 4a includes an operation button 4e that acts on a linkage rod 4f mounted along the longitudinal central plane of the swiveling lever 4a. When the swiveling lever 4a is in its central position as shown in Figure 2, the opposite end of the linkage rod 4f is positioned opposite an aperture 6b. This aperture 6b is provided in an arc-shaped crosspiece 6c

surrounding the drive take-off gear 4d that is formed on the swing lever 6.

**[0018]** The linkage rod 4f is held away from the aperture 6b via a pressure spring 4g. A spring 6a grips the swing lever 6 with one end, while the other end rests on the seat body 1. The spring 6a holds the intermediate gear 5 in contact with a drive gear 3a of the adjustment mechanism 3.

**[0019]** The swiveling lever 4a may be displaced upward or downward from its neutral position as far as the positions shown by dotted lines in Figure 3 and designated as 4a'. Displacement of the swiveling lever 4a either upward or downward from its central position causes rotation of the drive take-off gear 4d that is converted into a stepped adjustment of the seat back 2 by means of the intermediate gear 5 and the drive gear 3a mounted on the tilt axis 3b. Upon multiple actuations of the swiveling lever 4a upward or downward from the central position, the tilt of the seat back 2 may be altered, for example, through the tilt range designated by 2'.

**[0020]** When the seat back 2 is to be adjusted through a greater tilt angle than that shown in Figure 3, the actuation button 4e is pressed into the neutral central position of the swiveling lever 4a, as shown in Figure 4. The linkage rod 4f then penetrates the aperture 6b in the swing lever 6.

**[0021]** When the swiveling lever 4a is raised while the actuation button 4e is depressed, the swing lever 6 rotates about

the axis 4b, and the intermediate gear 5 is displaced away from the drive gear 3a. The drive gear 3a is thus free to rotate. This causes the spring 7 to move the seat back in a forward direction and to press the seat back 2 against the back of the seat occupant, if present. The seat back 2 can then be roughly manually adjusted (by the seat occupant, for example) into the position designated with 2" in Figure 5, as is normal with a raster adjustment mechanism.

**[0022]** After the intermediate gear 5 is engaged with the drive gear 3a, the now present tilt position of the seat back is locked by the stepped switching mechanism 4c. In any of these tilt positions of the seat back 2, fine adjustment of the tilt of the seat back is possible by means of the stepped switching mechanism 4c as previously described.

**[0023]** Although the present invention has been explained utilizing an automobile type seat, this is for exemplary purposes only and not a limitation of the present invention which can be implemented in any type of seat.

**[0024]** Modifications and substitutions by one of ordinary skill in the art are considered to be within the scope of the present invention that is not to be limited except by the claims which follow.